

REMARKS

Claims 1-41 are pending in the present application. In the Office Action dated March 20, 2003, the Examiner rejected claims 1, 4-7, 14, 17, 18, 22-25, 30, 32 and 35 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,183,253 B1 to Billet *et al.* ("Billet"). The Examiner also rejected claims 2, 3, 8, 15, 16, 27, 29, 31 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Billet. The Examiner further rejected claims 9-11, 19, 28 and 33 under 35 U.S.C. § 103(a) as being unpatentable over Billet in view of U.S. Patent No. 5,503,559 to Vari ("Vari").

Claims 37-41 are allowed. The Examiner further objected to claims 12, 13, 20, 21, 26 and 34 as being dependent on a rejected base claim, but indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Examiner is thanked for his indication of allowable subject matter in the present application.

Attorney for applicant participated in a telephone conversation with Examiner Lewis on June 6, 2003. The Examiner is thanked for granting the undersigned attorney the opportunity to further describe the embodiments of the present invention, and to discuss the prior art cited by the Examiner. Applicant nevertheless disagrees with the stated grounds of rejection and desires to further clarify various distinctions of applicants' invention over the cited art. Reconsideration of the present application is therefore requested in light of the present amendment and following remarks.

The disclosed embodiments of the invention will now be discussed in comparison to the prior art. It is understood, however, that the discussion of the disclosed embodiments, as well as the discussion of the differences between the disclosed embodiments of the present invention and the prior art do not define the scope or interpretation of any of the claims. Instead, such discussed differences, when presented, are offered merely to help the Examiner appreciate important claim distinctions as they are discussed.

The various embodiments of the present invention are directed to an apparatus and a method for obturating a canal in a tooth. In one embodiment of the invention, a plug is disclosed that is configured to be inserted into a canal of a tooth. Accordingly, the plug is suitably proportioned to fill the root canal in the tooth, and is comprised of a material that

exhibits sufficient flexibility to be readily inserted into the canal, yet is in a fully polymerized state prior to insertion of the plug into the canal. The plug is further optically transmissive, so that light may be projected through the plug so that the plug may be bonded to the walls of the canal by a light-activated sealing agent.

In another embodiment of the invention, a carrier is disclosed having an optically transparent or translucent plug portion that is mounted on a support. The support allows the plug portion to be properly positioned within the canal of the tooth, which may be severed from the plug portion following the insertion of plug portion into the canal. The support may also include a handle that is mounted on the support portion to assist a user to properly position the plug portion of the carrier in the canal. The plug portion is also suitably proportioned to fill the root canal, and comprised of a material in a fully polymerized state, yet retains sufficient flexibility to permit insertion of the plug portion into the canal. After the support is severed from the plug portion, the plug portion may be illuminated by a light source to set the light-activated sealing agent.

In still another disclosed embodiment, a carrier includes an optical fiber that extends along a support and into a plug portion. The carrier may be coupled to a light source so that light may be transferred from the source to the plug portion through the support in order to set a light-activated sealing agent. As in the previous embodiments, the plug portion of the carrier is comprised of a material having sufficient flexibility to be readily inserted into the canal, and is in a fully polymerized state prior to insertion of the plug portion into the canal. The plug portion is similarly proportioned to fill the root canal.

The Examiner has cited the Billet reference. Billet discloses an insert for filling a dental canal. With reference to Figure 3 of the Billet reference, the insert 8 is shown. The insert 8 is comprised of a semi-rigid and malleable core 10 that is formed from a material in a fully polymerized state, and is coated with one or more first sleeves 14 formed by a paste of a composite material *in a pre-polymerization state*. (col. 3, lines 10-13; col. 3, lines 49-53). The one or more sleeves 14 are retained by a sheath 15, itself made of a composite material *in the pre-polymerization state*. (col. 3 lines 65-66). The applicant therefore understands the reference to teach an insert that includes both polymerized components and non-polymerized components.

The Billet reference further provides the motivation for having the foregoing partially polymerized structure at col. 4, lines 22-27, which states in pertinent part:

"One of the essential points of the invention is that the whole of the insert material remains ductile and malleable so long as cross linking has not been voluntarily caused. The insert can therefore follow the exact shape of all the twists and curves of the root canal 1." (Emphasis added).

Applicant further points to the specification at col. 4, lines 33-35 that further states that:

"A third important point is that when cross-linking of the organic matrix is performed, the whole of the insert material will polymerize simultaneously." (Emphasis added).

Accordingly, applicant respectfully asserts that Billet does not disclose, teach or fairly suggest an insert for a root canal that is in a fully polymerized state prior to positioning the insert in the canal. Billet similarly fails to disclose, teach or fairly suggest a carrier having a plug portion for recessing into the canal of a tooth, and a support coupled to the plug portion that may be used to guide the plug portion into the canal.

The Examiner has also cited the Vari reference. Vari discloses an endodontic apparatus and method for the detection of the structure of a tooth, and for the restoration of a dead or severely decayed tooth using induced fluorescence spectroscopy. The apparatus includes an elongated tool and an optical fiber. The elongated tool is sized to fit within the root canal and has a central passage through which the optical fiber is passed. The optical fiber is retained in the passage, and the tip of the optical fiber is exposed at the end of the elongated tool.

Still referring to Vari, the optical fiber is coupled to a light source that emits light. The emitted light is guided into the canal by the fiber, which induces tissues within the canal to fluoresce. The fluorescence is then transmitted through the optical fiber to a sensor that generates electrical signals corresponding to the fluorescence of the tissues. The processor then processes the electrical signals to determine the structure and composition of the tissues comprising the tooth. The canal may be filled by inserting a long, hollow tube into the canal that also has an optical fiber. The hollow tube is coupled to a plunger that contains a light-activated restorative material that is used to force the material into the canal. Light transmitted to the restorative material by the optical fiber then cures the restorative material.

Vari does not disclose, teach, or fairly suggest a plug configured to be inserted into a canal of a tooth that is comprised of a fully polymerized and resilient material. Vari also fails to disclose, teach or fairly suggest a carrier having a plug portion for recessing into the canal of a tooth, and a support coupled to the plug portion that may be used to guide the plug portion into the canal, and is severable from the plug portion.

Turning now to the claims, differences between the claim language and the applied art will be specifically pointed out. Claim 1, as amended, recites in pertinent part, "A plug for insertion into an endodontically prepared root canal of a tooth, comprising...an elongated body comprised of a biologically implantable, resilient material having a distal end and a proximal end and having a length to allow the distal end to be positioned adjacent to an apical portion of the tooth when the body is inserted in the root canal of the tooth, *the body being further suitably proportioned to fill the root canal of the tooth, and comprised of a material that is optically transmissive and fully polymerized prior to insertion into the root canal of the tooth.*" (Emphasis added). The Billet reference simply does not disclose this. Instead, Billet discloses a composite structure consisting of polymerized and non-polymerized materials. The non-polymerized materials are polymerized, or cross-linked when the insert is positioned within the root canal by exposing the insert to a light source. Claim 1 is therefore allowable over the Billet reference. Claims depending from claim 1 are also allowable based upon the allowability of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 14, as amended, recites in pertinent part, "A carrier for root canal obturation in an endodontically prepared tooth, comprising...an elongated plug portion comprised of a biologically implantable, resilient material having a distal end and a proximal end and having a length to allow the distal end to be positioned adjacent to an apical portion of the tooth when the plug portion is inserted in the root canal of the tooth, the plug portion being further comprised of a material that is optically transmissive *and fully polymerized prior to insertion into the root canal of the tooth...*and...an elongated support portion having a first end coupled to the proximal end of the plug portion and an opposing second end." (Emphasis added). Again, the Billet reference does not disclose a plug portion comprised of a resilient material that is fully polymerized prior to insertion into the root canal of the tooth. Billet also fails to disclose a support portion coupled to the plug portion. Accordingly, claim 14 is now allowable over the

Billet reference. Claims depending from claim 14 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 25, as amended, recites in pertinent part, “A method for obturating a root canal passage in a tooth, comprising...applying a light-curing adhesive to the root canal passage...inserting an optically transmissive plug into the root canal passage, *the plug being in a fully polymerized condition prior to inserting the plug into the root canal passage...and...exposing a portion of the plug to a light source to cure the adhesive.*” (Emphasis added). Again, Billet does not disclose a plug configured for insertion into a root canal that is comprised of a material that is fully polymerized prior to insertion. Claim 25 is allowable over the Billet reference. Claims depending from claim 25 are similarly allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Finally, claim 32, as amended, recites in pertinent part, “A method for obturating a root canal passage in a tooth, comprising...applying an adhesive to the root canal passage...inserting an optically transmissive plug into the root canal passage, *the plug being in a fully polymerized condition prior to inserting the plug into the root canal passage...and...curing the adhesive.*” (Emphasis added). Claim 32 is also now allowable over the Billet reference. Claims depending from claim 32 and also allowable based upon the allowable form of claim 32 and also in view of the additional limitations recited in the dependent claims.

With reference to the Examiner’s rejection of claims under 35 U.S.C. § 103(a) based upon the combination of Billet and Vari, applicant respectfully submits that the foregoing amendments fully address the stated grounds of rejection.

In light of the foregoing amendments and remarks, Applicant asserts that all claims are in condition for allowance, and that action is respectfully requested. If there are any remaining matters that can be handled in a telephone conference, the Examiner is invited to telephone the undersigned attorney, Steven H. Arterberry, at (206) 903-8787.

Respectfully submitted,  
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